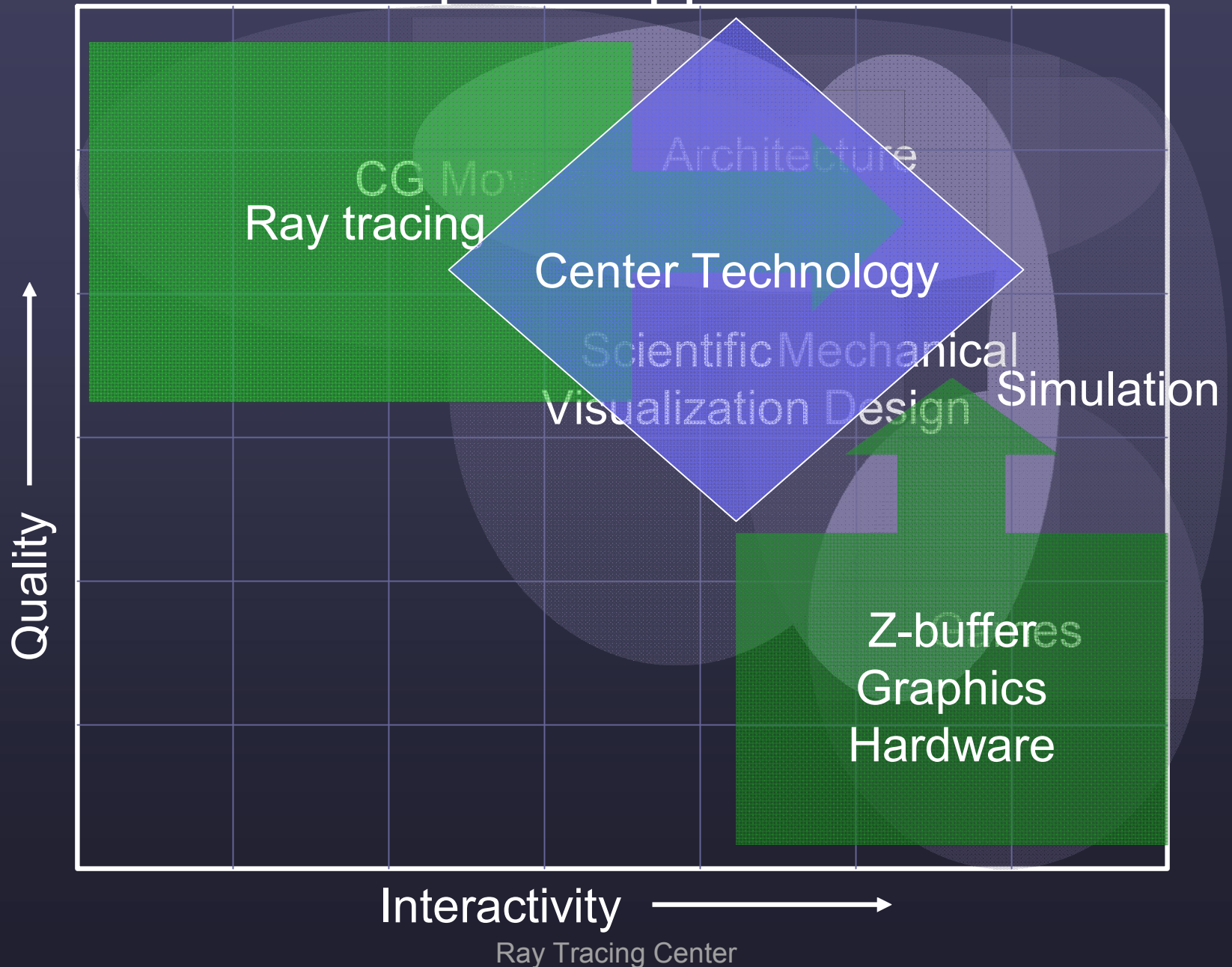


Proposed Center
for
Interactive Ray Tracing
and
Photo Realistic Visualization

Steven Parker • Peter Shirley • Greg Jones

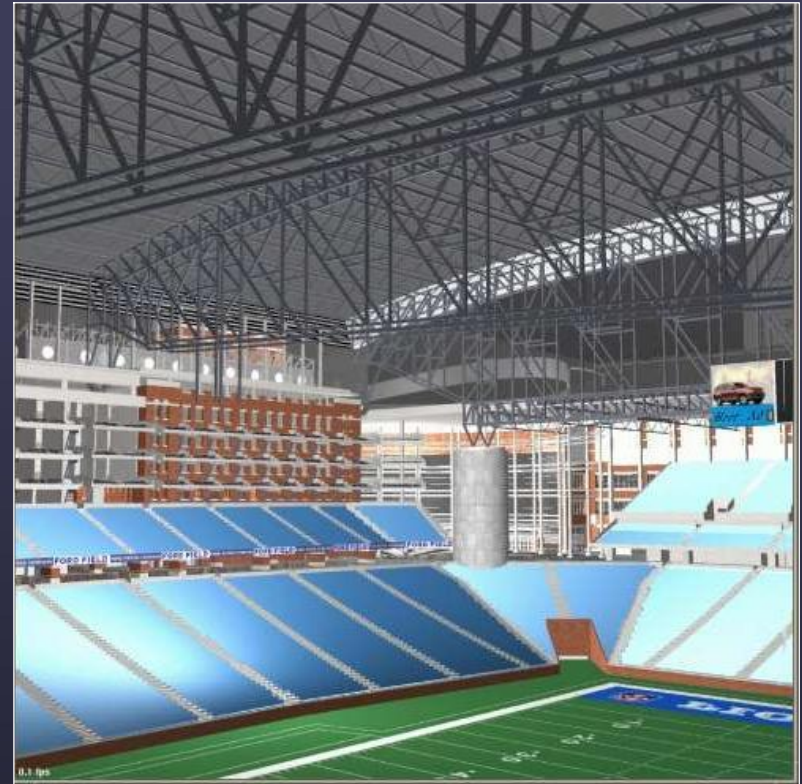


Graphics Applications



Interactive Ray Tracing

- Problem: Data glut
 - Computer graphics allows exploration
 - Data getting bigger, graphics not keeping up
- Industry solution:
 - Build sophisticated hardware designed for games
- Our solution:
 - Use a better algorithm
 - Take advantage of modern CPUs



*Interactive Ray Tracing:
Detroit Lions Stadium*

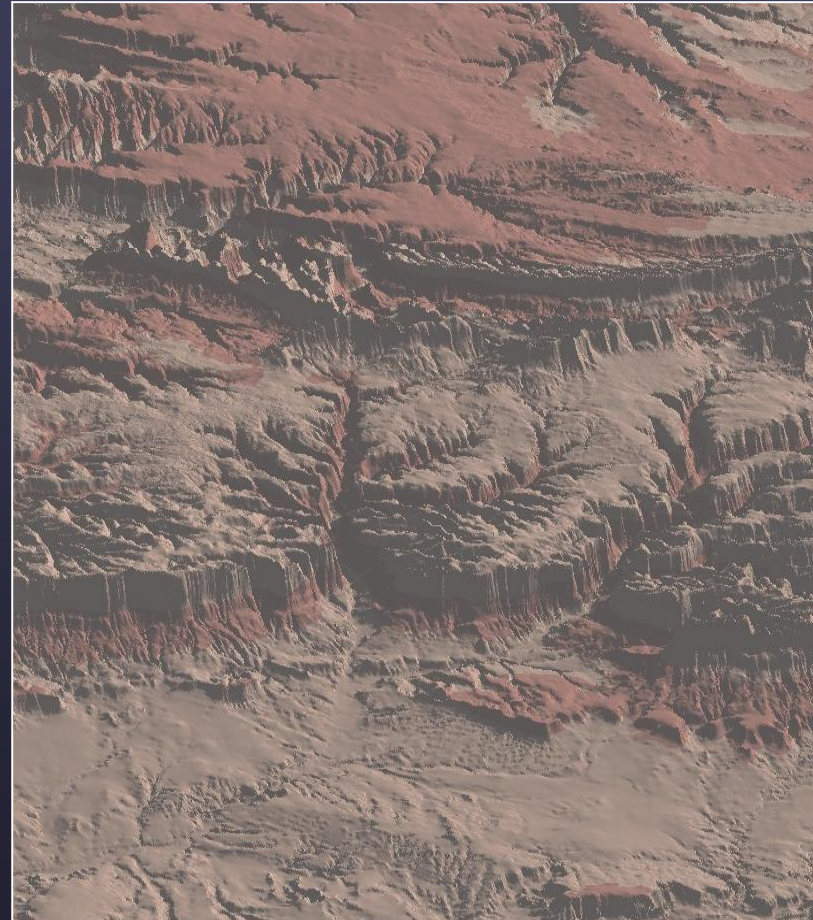
Photorealism: Which is real, which is fake?



Wyman, U of Utah

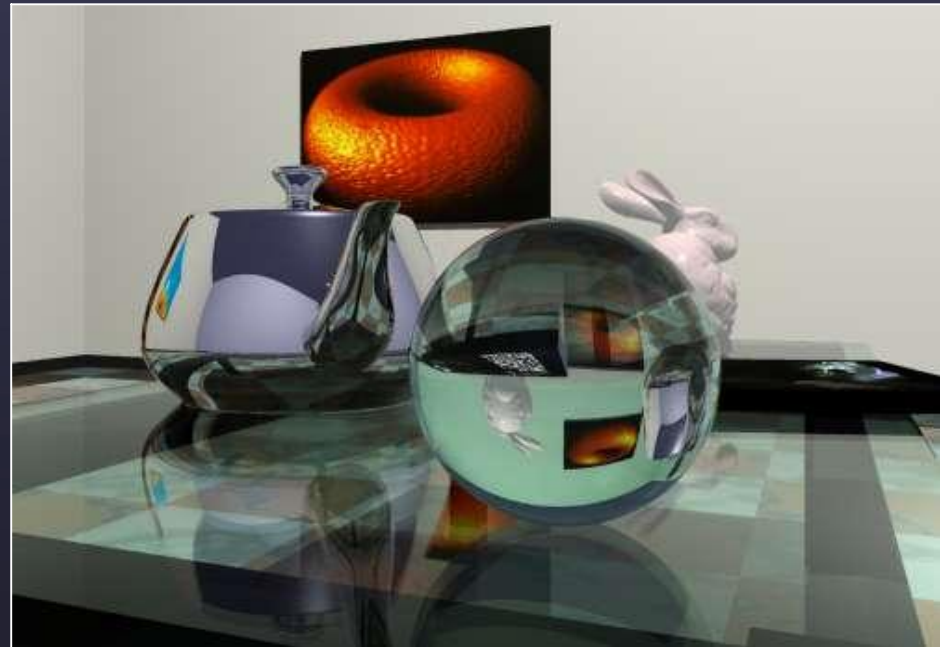
Why Ray Tracing

- Dataset trends:
 - Complex CAD models (Boeing 777: 100M+ polygons)
 - Medical scans reaching 10000x10000x10000 (4 Terabytes)
 - Scientific simulations routinely produce terabytes of data
- Hardware trends favor ray tracing



Current Technology

- Developed at U of Utah over last 8 years
- Photorealism developed over last 20 years
- IEEE Visualization 1998: best paper award
- Rapidly becoming practical on commonly available hardware
- Commercial grade system available < 1 year
- Funded by:
 - National Science Foundation
 - Department of Energy
 - Honda
- Disclosed to Tech Transfer Office



Interactive Ray Tracing

Market Opportunity

- Hardware now inexpensive enough
- Several interested parties:
 - Large computer manufacturer
 - Los Alamos National Lab
 - Japanese automobile manufacturer
 - Oil/gas company
 - NIH
 - Numerous research groups

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

*Interactive Ray Tracing:
Detroit Lions Stadium*

Center of Excellence plans

- Current system funded and used by research
 - Over 15:1 leveraging for first year alone
 - A workhorse for scientists at the U
 - New features driven by research interests
- Center of Excellence will add products:
 - Software engineering support and hardening
 - New features driven by market interests
 - GUIs for specific markets
 - CAD interfaces
 - Tuning for specific market problems
 - Domain data import

Competitive Analysis

- High-end systems:
 - Maya, SoftImage, Mental Ray
- Hardware companies:
 - ATI, NVidia
- Several ray tracing projects in development:
 - InTrace, SGI, Intel, at least 3 others
- We have an 8 year head start on interactive ray tracing

Management Team

- Steven Parker PhD, PI
 - Architect of interactive ray tracing system
- Peter Shirley PhD, Co-PI
 - Author of two graphics books
- Greg Jones PhD, MBA, Co-PI
 - 8+ years industry experience
 - Member 2005 v|100 - vSpring Top 100 Venture Entrepreneurs
- Have worked together for 6+ years
- Successful prior Center of Excellence
- Additional marketing consultants will be hired



*Interactive Ray Tracing:
Graphics Museum Walkthrough*

Why this Center?

- Help breathe new life into Utah graphics industry
 - Industry began life at U of U
 - U of U still academic leader in graphics and visualization, but graduates leave the state
- Our technology is better than competition's
- Commercialization is the best way to prove our technology



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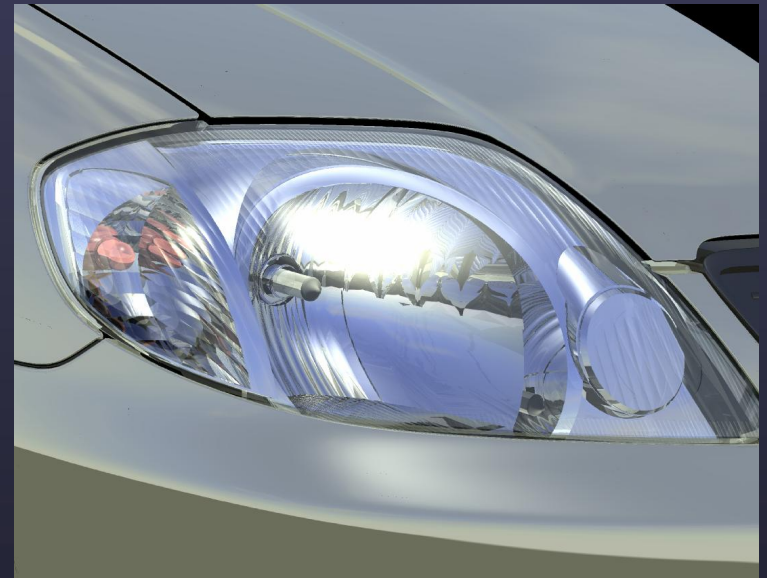
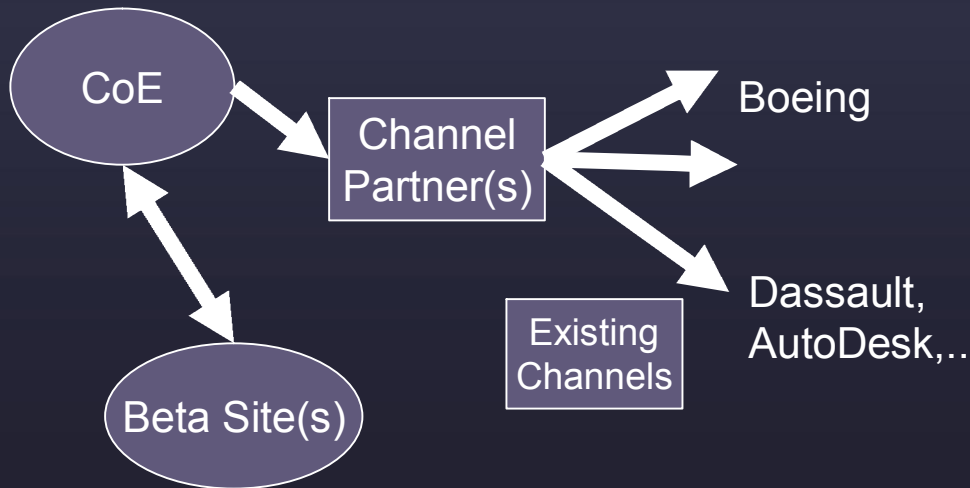
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Marketing Strategy

- First Potential Market: Computer Aided Design/Manufacturing

- Market Needs:

Interactivity (speed),
Realism, Fidelity



Interactive Ray Tracing: Headlight

Marketing Strategy

- Primary Channel Partner
 - **Large multi-national hardware provider**
 - Strong channels in multiple verticals
 - Large hardware installations in many verticals
 - GM, Honda, Ford, John Deere, etc...
 - Need unique software to pull hardware into the channels

Financial Projections for Manufacturing/Engineering Vertical

	Year 1	Year 2	Year 3	Year 4	Year 5
Revenues	\$1,600,000	\$12,480,000	\$29,120,000	\$45,760,000	\$54,080,000
Expenses*	\$1,060,800	\$6,876,480	\$16,656,640	\$27,135,680	\$33,205,120
Income	\$539,200	\$5,603,520	\$12,463,360	\$18,624,320	\$20,874,880

* Product specific expenses based on support, license, and channel partner expenses

Use of Funds

- In depth market analysis of target verticals
 - Manufacturing/Engineering
 - Entertainment
- Product hardening
- Vertical specific user interface development
- Beta site implementations



Center for
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Products Envisioned

- Software product:
 - Interactive viewer for target applications
 - User interface to make changes interactively
- Hardware bundle:
 - Commodity high-end workstation or low-end cluster
 - Center software
- Consulting services:
 - Improve performance for customer-specific data
 - Gateways to proprietary formats



Rendering Algorithms

Basic idea: modeling the physics of light

- Rasterization (Z-buffer)
 - Invented at U of U in 1974
 - Hardware in every modern PC
 - High interactivity, increasing quality
- Ray tracing
 - Whitted 1980
 - High quality, increasing interactivity

